

Amendments to the Claims

1. (Currently Amended) An apparatus utilizing a lamp for treatment of a patient's skin, said apparatus including:

a first reflective mechanism adapted to be in optical communication with the lamp; and

a waveguide having a first surface adapted to be in optical communication with the patient's skin and a second surface adapted to be in optical communication with the lamp; said waveguide being of a length selected to enhance uniformity of an optical output from the apparatus, and the first reflective mechanism, the waveguide configured such that the first surface is smaller than the second surface, and wherein the uniformity of an optical output from the apparatus is enhanced and the radiation losses are lessened by said waveguide being positioned adjacent the lamp to reduce a gap formed between said second surface and the lamp and the distance between the first and second surfaces of said waveguide being of a selected length, adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin; and

a reflective mechanism which inhibits the loss of photons from said apparatus.

2. (Cancelled)

3. (Currently Amended) An apparatus as claimed in claim 21 including a reflective material substantially sealing any gap between said reflector first reflective mechanism and said waveguide.

4. (Currently Amended) An apparatus as claimed in claim 1 wherein said mechanism includes a reflector, said reflector being first reflective mechanism is sized and mounted with respect to said the lamp so as to minimize the number of reflections for each photon reflected from said first reflective mechanism on said reflector.

5. (Cancelled)

6. (Withdrawn) An apparatus as claimed in claim 4 wherein said reflector is formed on an outer surface of said lamp.

7. (Withdrawn) An apparatus as claimed in claim 4 including a tube surrounding said lamp, there being a gap between said lamp and tube through which a fluid is flowed to cool the lamp.

8. (Currently Amended) An apparatus as claimed in claim 17, further comprising a tube surrounding the lamp, wherein said ~~reflector~~ first reflective mechanism is formed on one of an inner and outer surface of said tube.

9. (Currently Amended) An apparatus as claimed in claim 4 wherein ~~said reflector~~ first reflective mechanism has a substantially cylindrical shape.

10. (Currently Amended) An apparatus as claimed in claim 4 wherein ~~said reflector~~ first reflective mechanism is a scattering reflector.

11. (Withdrawn) An apparatus as claimed in claim 10 including a mechanism for controlling the wavelengths filtered by said scattering reflector.

12. (Withdrawn) An apparatus as claimed in claim 4 wherein said reflector is of a material which filters selected wavelengths of light from said lamp impinging thereon.

13. (Cancelled)

14. (Withdrawn) An apparatus as claimed in claim 1 including a mechanism for selectively filtering light from said lamp to achieve a desired wavelength spectrum, said mechanism for selectively filtering being included as part of at least one of said lamp, a coating formed on said lamp, a tube surrounding said lamp, a filter device in a gap between said lamp and said tube, a reflector for light from said lamp, the waveguide, and a filter device between said lamp and said waveguide.

15. (Withdrawn) An apparatus as claimed in claim 14 wherein said mechanism for selectively filtering is included as part of a plurality of the components listed in claim 14.

16. (Withdrawn) An apparatus as claimed in claim 14 wherein said mechanism for selectively filtering is at least one of an absorption filter, a selectively reflecting filter, and a spectral resonant scatterer.

17. (Withdrawn) An apparatus as claimed in claim 14 wherein said mechanism includes a multilayer coating.

18. (Cancelled)

19. (Previously Presented) An apparatus as claimed in claim 1 wherein the uniformity of light output from said waveguide has resonances as a function of waveguide length, and wherein the length of said waveguide is equal to one of the resonant lengths.

20. (Currently Amended) An apparatus as claimed in claim 1 wherein said second surface of said waveguide has a width and depth ~~at an end of the waveguide adjacent the lamp~~, and wherein the length of the waveguide is ~~much greater than~~ than the smaller of said width and depth.

21. (Original) An apparatus as claimed in claim 1 including a mechanism for controlling the angular spectrum of photons within the patients skin.

22. (Withdrawn) An apparatus as claimed in claim 21 including a gap between the lamp and said waveguide which gap is filled with a substance having a selected index of refraction.

23. (Withdrawn) An apparatus as claimed in claim 22 wherein the length of said gap is minimized.

24. (Withdrawn) An apparatus as claimed in claim 22 wherein said gap is filled with air.

25. (Currently Amended) An apparatus as claimed in claim 1 wherein said waveguide has a larger area at a light receiving surface ~~then~~ than at a light output surface, and wherein said waveguide has curved sides between said surfaces.

26. (Withdrawn) An apparatus as claimed in claim 1 wherein said waveguide has a plurality of cuts formed therethrough, said cuts being adapted to have a coolant fluid flow therethrough.

27. (Currently Amended) An apparatus as claimed in claim 1 wherein ~~said waveguide has a surface adapted to contact the patient's skin, and said waveguide~~ first surface is patterned to control the delivery of photons to the patient's skin.

28. (Currently Amended) An apparatus as claimed in claim 1 wherein ~~said waveguide has a surface adapted to contact the patient's skin which is concave~~ first surface comprises a concave surface to treat an area of the patient's skin proximate to said concave surface.

29. (Currently Amended) An apparatus as claimed in claim 281 where said first surface includes ~~waveguide has one of a concave surface adapted to contact the patient's skin and~~ a rim surrounding the waveguide with a concave edge.

30. (Original) An apparatus as claimed in claim 28 wherein the depth of said concave surface is selected to, in conjunction with pressure applied to the apparatus, control the depth of blood vessels treated by the apparatus.

31. (Cancelled)

32. (Previously Presented) An apparatus as claimed in claim 1 wherein said waveguide has a surface shaped to permit the application of selective pressure to the patient's skin and to thereby control the depth at which treatment is performed.

33. (Cancelled)

34. (Withdrawn) An apparatus as claimed in claim 1 wherein said waveguide is at least in part one of a lasing and a superluminescent waveguide.

35. (Withdrawn) An apparatus as claimed in claim 34 wherein said waveguide includes a lasing waveguide inside an optical waveguide.

36. (Withdrawn) An apparatus as claimed in claim 1 wherein said waveguide has a skin contacting surface, and including a mechanism which delivers a cooling spray to both the patient's skin and said skin contacting surface just prior to said surface making contact with the skin.

37. (Withdrawn) An apparatus as claimed in claim 36 wherein said waveguide includes a lower portion adjacent the patient's skin of a material which is a good conductor of heat and an upper portion of a material which is not a good conductor of heat, the thickness of said lower portion controlling the depth of cooling in the patient's skin.

38. (Withdrawn) An apparatus as claimed in claim 36 wherein said mechanism includes a detector indicating when the apparatus is within a predetermined distance of the patient's skin, said cooling spray being activated in response to said detector.

39. (Withdrawn) An apparatus as claimed in claim 1 including a rearward facing light output channel from said waveguide which leads to a backscatter detector, said

channel being at an angle α to a perpendicular to the skin which assures that only backscattered light reaches the detector.

40. (Withdrawn) An apparatus as claimed in claim 1 wherein said lamp is driven with a power profile which is one of the power profiles 44, 45 and 46 of Fig. 11.

41. (Cancelled)

42. (Withdrawn) A method for utilizing a lamp for performing hair removal utilizing the parameters of table 1.

43. (Withdrawn) A method for utilizing a lamp for performing treatment of vascular lesions utilizing the parameters of table 2, 3 and 4.

44. (Withdrawn) A method for utilizing a lamp for performing skin rejuvenation utilizing the parameters of tables 2 and 6.

45. (Withdrawn) A method for utilizing a lamp for performing treatment of acne by at least one of killing bacteria, thermolysis of the sebaceous gland and killing spider veins feeding the sebaceous gland.

46. (Withdrawn) A method of utilizing a lamp for performing treatment of pigmented lesions utilizing the parameters of table 5.

47. (Currently Amended) An apparatus utilizing a lamp for treatment of a patient's skin, said apparatus including:

a mechanism for directing photons from said lamp through said waveguide to the patient's skin, said mechanism including a reflector, said reflector being mounted close enough to said lamp so as to reduce the number of reflections for each photon on said reflector; and

a waveguide having a first surface adapted to be in optical communication with the patient's skin and a second surface adapted to be in optical communication with the source lamp and the reflector, said waveguide being of a length selected to enhance uniformity of an optical output from the apparatus, configured to concentrate the light passing therethrough and wherein the uniformity of an optical output from the apparatus is enhanced and the radiation losses are lessened by said waveguide being positioned adjacent the lamp to reduce a gap formed between said second surface and the lamp and the distance between the first and second surfaces of said waveguide being of a selected length, and adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin; and

a mechanism for directing photons from said lamp through said waveguide to the patient's skin, said mechanism including a reflector, said reflector being mounted close enough to said lamp and being small enough so as to minimize the number of reflections for each photon on said reflector.

48. (Original) An apparatus as claimed in claim 47 wherein said reflector is formed on an outer surface of said lamp.

49. (Withdrawn) An apparatus as claimed in claim 47 including a tube surrounding said lamp, there being a gap between said lamp and tube through which a fluid is flowed to cool the lamp.

50. (Withdrawn) An apparatus as claimed in claim 49 wherein said reflector is formed on one of an inside and an outside surface of said tube.

51. (Original) An apparatus as claimed in claim 47 wherein said reflector has a substantially cylindrical shape.

52. (Original) An apparatus as claimed in claim 47 wherein said reflector is a scattering reflector.

53. (Withdrawn) An apparatus as claimed in claim 52 including a mechanism for controlling the wavelengths filtered by said scattering reflector.

54. (Withdrawn) An apparatus as claimed in claim 47 wherein said reflector is of a material which filters selected wavelengths of light from said lamp impinging thereon.

55. (Withdrawn) An apparatus utilizing a lamp for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with the patient's skin;

a mechanism for directing photons from said lamp through said waveguide to the patient's skin; and

a mechanism for selectively filtering light from said lamp to achieve a desired wavelength spectrum, said mechanism for selectively filtering being included as part of at least one of said lamp, a coating formed on said lamp, a tube surrounding said lamp, a filter device in a gap between said lamp and said tube, a reflector for light from said lamp, the waveguide, and a filter device between said lamp and said waveguide.

56. (Withdrawn) An apparatus as claimed in claim 55 wherein said mechanism for selectively filtering is included as part of a plurality of the components listed in claim 53.

57. (Withdrawn) An apparatus as claimed in claim 55 wherein said mechanism for selectively filtering is at least one of an absorption filter, a selectively reflecting filter, and a spectral resonant scatterer.

58. (Withdrawn) An apparatus as claimed in claim 55 wherein said mechanism includes a multilayer coating.

59. (Currently Amended) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide adapted to receive radiation from the source and having a first surface adapted to be in optical communication with the patient's skin and a second

surface adapted to be in optical communication with the source, said waveguide being of a length selected to enhance uniformity of an optical output from the apparatus, configured such that the first surface is smaller than the second surface, ~~and adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin; and~~ a first reflector that captures and redirects scattered photons from the source through the waveguide; and

wherein the source includes an axis having a length greater than a corresponding length of said second surface and said apparatus further comprises a second reflector having surfaces disposed adjacent said waveguide and spaced apart from the source, and having reflective surfaces substantially parallel to said second surface and extending beyond said second surface to direct photons from the source toward said first reflector.

60. (Original) An apparatus as claimed in claim 59 wherein the uniformity of optical output from said waveguide has resonances as a function of waveguide length, and wherein the length of said waveguide is equal to one of the resonant lengths.

61. (Currently Amended) An apparatus as claimed in claim 59 wherein said waveguide has a width and depth at an end of the waveguide adjacent the source, and wherein the length of the waveguide is much greater ~~than~~ than the smaller of said width and depth.

62. (Withdrawn) An apparatus utilizing a lamp for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with the patients skin;

a mechanism for directing photons from said lamp through said waveguide to the patient's skin; and

a gap between the lamp and said waveguide which gap is filled with a substance having an index of refraction so as to selectively control the angular spectrum of photons within the patient's skin.

63. (Withdrawn) An apparatus as claimed in claim 62 including a tube spaced from and substantially surrounding said lamp, and wherein said gap is between said tube and said waveguide.

64. (Withdrawn) An apparatus as claimed in claim 62 wherein the length of said gap is minimized.

65. (Withdrawn) An apparatus as claimed in claim 62 wherein said gap is filled with air.

66. (Currently Amended) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide having an index of refraction greater than 1.4 and adapted to be in optical contact with the patient's skin, said waveguide having a larger area at a radiation receiving surface ~~then than~~ at a radiation output surface, and wherein said waveguide has curved sides between ~~said radiation receiving and output surfaces and is adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin~~; and

a mechanism for directing photons from said source through said waveguide to the patient's skin.

67. (Currently Amended) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide having an index of refraction greater than 1.7 and adapted to be in optical contact with the patient's skin, said waveguide having a larger area at a radiation receiving surface ~~then than~~ at a radiation output surface and having side walls between said surfaces ~~wherein said walls are substantially uncoated with material which absorbs light from the optical radiation source and adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin~~;

a plurality of reflectors ~~on spaced apart from~~ each of said walls to ~~inhibit reflect~~ photons ~~from said source leakage back~~ through said walls; and

a mechanism for directing photons from said source through said waveguide to the patient's skin.

68. (Withdrawn) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with the patient's skin, said waveguide having a plurality of cuts formed therethrough, said cuts being adapted to have a coolant fluid flow therethrough; and

a mechanism for directing photons from said source through said waveguide to the patient's skin.

69. (Previously Presented) An apparatus utilizing an optical radiation source to perform optical dermatology on a patient's skin, said apparatus including:

a waveguide adapted to be in contact with the patient's skin, said waveguide having a surface in contact with the patient's skin which is patterned to control the delivery of photons to the patient's skin; and

a mechanism for directing photons from said source through said waveguide to the patient's skin.

70. (Currently Amended) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide being of a length selected to enhance uniformity of an optical output from the apparatus and comprising

a first surface adapted to be in optical communication with the patient's skin, wherein said first surface is concave, and

a second surface adapted to be in optical communication with an optical radiation source,

wherein said waveguide is configured to concentrate radiation as it passes through the waveguide, ~~and adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin; and~~

a reflective mechanism for directing photons from said source through said waveguide to the patient's skin wherein said waveguide and said reflective mechanism are each positioned substantially in point contact to said source.

71. (Currently Amended) An apparatus as claimed in claim 70 where said first surface of said waveguide has one of a concave skin contacting surface and a rim surrounding the waveguide with a concave edge.

72. (Original) An apparatus as claimed in claim 70 wherein the depth of said concave surface is selected to, in conjunction with pressure applied to the apparatus, control the depth of blood vessels treated by the apparatus.

73. (Cancelled)

74. (Currently Amended) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide having a first surface adapted to be in optical communication with the patient's skin and a second surface adapted to be in optical communication with a lamp the source, configured such that the first surface is smaller than the second surface, and adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin, wherein said first surface is adapted for application of selective pressure to the skin to control the depth of treatment;

and the distance between said first and second surfaces of said waveguide being of a length selected to enhance uniformity of an optical output from the apparatus; and

a reflective mechanism for directing photons from said the source through said waveguide to the patient's skin wherein said waveguide and said reflective mechanism are each positioned proximate to the source such that the losses of optical radiation due to reflections between the patient's skin and said surface of said reflective mechanism are substantially lessened.

75. (Cancelled)

76. (Withdrawn) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with the patient's skin, said waveguide being at least in part one of a lasing and a superluminescent waveguide; and
a mechanism for directing photons from said source through said waveguide to the patient's skin.

77. (Withdrawn) An apparatus as claimed in claim 76 wherein said waveguide includes a lasing material with mirrors on the end inside an optical waveguide.

78. (Withdrawn) An apparatus for utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with a patient's skin;
at least one of a lasing and a superluminescent material surrounding said lamp;
and a mechanism for directing photons from said source through said waveguide to the patient's skin.

79. (Withdrawn) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide having a skin contacting surface adapted to be in contact with the patient's skin;
a mechanism for directing photons from said lamp through said waveguide to the patient's skin; and
a mechanism which delivers a cooling spray to both the patient's skin and said skin contacting surface just prior to said surface making contact with the skin.

80. (Withdrawn) An apparatus as claimed in claim 79 wherein said waveguide includes a lower portion adjacent the patient's skin of a material which is a good conductor of heat and an upper portion of a material which is not a good conductor of

heat, the thickness of said lower portion controlling the depth of cooling in the patient's skin.

81. (Withdrawn) An apparatus as claimed in claim 79 wherein said mechanism includes a detector indicating when the apparatus is within a predetermined distance of the patient's skin, said cooling spray being activated in response to said detector.

82. (Withdrawn) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with the patient's skin;

a mechanism for directing photons from said lamp through said waveguide to the patient's skin; and

a rearward facing light output channel from said waveguide which leads to a backscatter detector, said channel being at an angle α to a perpendicular to the skin which assures that only backscattered light reaches the detector.

83. (Withdrawn) An apparatus utilizing a lamp for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical contact with the patient's skin;

a mechanism for directing photons from said lamp through said waveguide to the patient's skin; and

a lamp driver which drives said lamp with a power profile which is one of the power profiles 44, 45 and 46 of Fig. 11.

84. (Currently Amended) An apparatus utilizing a lamp for treatment of a patient's skin, said apparatus including:

a waveguide adapted to be in optical communication with the patient's skin, said waveguide being formed as a unitary component with said the lamp passing through an opening formed therein, wherein said waveguide includes an inner surface and an outer surface; and

~~a reflective mechanism disposed on said outer surface for directing photons from said lamp through said waveguide to the patient's skin and is adapted to deliver a beam of light with a dimension greater than 10 mm to the patient's skin.~~

85. (Withdrawn) A method of using optical radiation to treat a patient's skin, said method including:

applying optical radiation from an optical radiation source through a plate having a first surface in contact with the patient's skin to the skin; and

applying a cooling fluid to a surface of the plate opposite said first surface; the thickness of said plate being selected to control the depth in the patient's skin to which cooling occurs.

86. (Cancelled)

87. (Cancelled)

88. (Withdrawn) An apparatus for utilizing optical radiation to treat a patient's skin, the apparatus including:

a source of optical radiation; and

a waveguide through which radiation from the source is applied to the patient's skin, the waveguide having scattering properties which are a function of the temperature of the waveguide, whereby the waveguide may automatically control radiation applied to the patient's skin to compensate for changes in patient skin temperature.

89. (Withdrawn) Apparatus for utilizing an optical radiation from a lamp to treat a patient's skin, the apparatus including:

a mechanism for applying radiation from the lamp to the patient's skin; and a filtering mechanism which prevent all but at least one band of radiation from the lamp to reach the patient's skin, said at least one band being selected such that the temperature at a desired target in the patient's skin to the temperature of the patient's epidermis has a selected value.

90. (Withdrawn) Apparatus as claimed in claim 89 wherein said selected value is greater than one.

91. (Withdrawn) Apparatus as claimed in claim 89 wherein there are a plurality of bands passed by said filtering mechanism.

92. (New) An apparatus as claimed in claim 1 wherein said waveguide further includes a plurality of angled walls extending between said first and second surfaces; and a second reflective mechanism at least partially surrounding said plurality of angled walls and having a plurality of reflective surfaces disposed substantially parallel to corresponding ones of said plurality of angled walls.

93. (New) An apparatus as claimed in claim 92 wherein the lamp has a axis length greater than a corresponding length of said second surface and said apparatus further comprises a third reflective mechanism disposed adjacent said waveguide and spaced apart from the lamp, and having reflective surfaces substantially parallel to said second surface and extending beyond said second surface to direct photons from the lamp toward said first reflective mechanism.

94. (New) An apparatus as claimed in claim 69 wherein said waveguide surface includes at least one of a modulated profile, a spatial mask, a flat mask and a phase mask.

95. (New) An apparatus as claimed in claim 84 wherein said waveguide further includes an output surface and the length of the output surface is approximately equal to the length of the inner surface in a direction parallel to the axis of the lamp.

96. (New) An apparatus as claimed in claim 1 wherein said waveguide length and position with respect to the lamp are selected to provide a skin irradiation amplification greater than 2.0.

97. (New) An apparatus as claimed in claim 19 wherein the length of said waveguide is selected to be less than the fourth resonant length and to provide an unevenness which is less than 1.0.

98. (New) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a reflective mechanism adapted to be in optical communication with the optical radiation source which inhibits the loss of photons from said apparatus; and

a waveguide having a first surface adapted to be in optical communication with the patient's skin and a second surface adapted to be in optical communication with the optical radiation source and the reflective mechanism, configured such that the first surface is smaller than the second surface, and wherein the uniformity of an optical output from the apparatus is enhanced and the radiation losses are lessened by said waveguide being positioned adjacent the lamp to reduce a gap formed between said second surface and the lamp and the distance between the first and second surfaces of said waveguide being of a selected length.

99. (New) An apparatus as claimed in claim 98 wherein the optical radiation source comprises an incandescent radiation source.

100. (New) An apparatus utilizing an optical radiation source for treatment of a patient's skin, said apparatus including:

a waveguide including a unitary concave surface adapted to contact the patient's skin and to uniformly treat an area of the patient's skin proximate to said surface; and

a reflector in optical communication with said waveguide and wherein the source is positioned between and adjacent said reflector and said waveguide to enhance uniformity of an optical output from the apparatus and to substantially lessen radiation losses.

101. (New) An apparatus as claimed in claim 100 wherein said concave surface further comprises a rim surrounding said waveguide with a concave edge.

Amendments to the Drawings :

The attached replacement sheet of drawings includes changes to Fig. 18. Reference numeral 7 now points to the gap as described in the specification.

Attachments: Replacement Sheet
Annotated Sheet Showing Changes